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ABSTRACT

Well-written, with a flair for character development, and focusing on controversial issues, Michael Crichton's novel "The Andromeda Strain" can precipitate lively discussions in science, English, and social studies classes and can help students to integrate all three areas. English and science teachers can collaborate in a variety of ways in teaching the novel. The simplest way for English teachers to start is to invite a science colleague to speak to the class. Another level of collaboration involves convincing a science colleague to incorporate the novel into one or more courses in which the English teacher would teach the literary perspective and the science teacher would teach the scientific perspective. The closest level of collaboration involves the science and English teacher working together to plan the unit. "The Andromeda Strain" puts science into a real-life context, integrates biology, chemistry, physics, and earth sciences with one another and with current events, and might help students to further their own subject-matter integration. (RS)

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The Andromeda Strain

as Science and Literature

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The Andromeda Strain

as Science and Literature

by Nancy Kaczmarek

At the outset of this presentation, I would like to acknowledge V. M. Caldwell, Director of Educational Services at the Buffalo (NY) Museum of Science, who first gave me the idea of teaching science and literature through The Andromeda Strain by sharing with me her experience of teaching it.

Although The Andromeda Strain, by Michael Crichton, was published in 1969, it continues to be useful for teaching both science and literature. For those of you who are unfamiliar with the book, let me read this summary from Something About the Author (1976, pp. 44-45):

> The Andromeda Strain, a "science-nonfiction" novel, is concerned with the attempts of four scientists, mobilized on a minute's notice and sent to a top-secret laboratory installation five stories beneath the Nevada desert, to save the world from an alien bacterial strain, code named Andromeda, which was dropped on Earth by a Project Scoop satellite. If the scientists fail, and if the germ invades the uncontrolled atmosphere, the laboratory will "self-destruct" and the scientists will thereby be sacrificed. As John Allen writes, "under the scientific-fictional gloss there's an old-fashioned Whodunit in the form of a Whatdunit."

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The reading level of The Andromeda Strain is assessed at 12th grade plus, but that is probably inflated because of the inclusion of scientific terms. A teacher also needs to take note of two other things that influence its readability: allusions to things that will be explained later (for instance, Directive 7-12 is mentioned before it is described) and events out of chronological order. Students may need to be alerted to these literary techniques in order to smooth their reading; other readers may take them in stride. In general, however, this book is accessible to college-bound ninth graders and is of interest to high school and college students as well as adults.

The Andromeda Strain is useful as literature for several reasons. It is generally acknowledged to be well-written, and so increases students' exposure to good language models. It has a flair for character development and focuses on some controversial issues, particularly the public's right to know. The question of right to know as presented in The Andromeda Strain can precipitate lively discussions in science, English, and social studies classes and can help students to integrate all three areas. It also shows the place of literature in science and technology, thus helping students to break down the compartments they build between subjects. It helps readers see the role of imagination in science and can enable growth in the scientific perspective in students who believe that science is an accumulation of facts.

The Andromeda Strain is also useful as science, in almost any science course. Biological topics discussed include biological warfare, microcleanliness, the definition of life, and processes of analyzing biological organisms. Chemistry references include the acid-base range of livable environments, the implications of acid rain, chemical and biochemical testing procedures, and the chemistry of plastics. In physics, readers encounter references to radar, sonar, space exploration (launch, orbits, return to earth), and nuclear bombs. Even earth science is included in geographical and topological references and references to wind currents.

Given the usefulness of The Andromeda Strain as both science and literature, what kinds of things can English and science teachers do collaboratively in teaching it? Perhaps the simplest way to start, if the impetus comes from you, the English teacher, is to invite your science colleague into your class as a guest speaker to elaborate on one of the topics raised in the book--for example, space-exploration launches, where scientists begin in analyzing unknown substances, the definition of life (one of the scientists in the book makes a convincing case for a piece of black cloth as a living thing), the Rule of 48 ("All scientists are blind"). Or the science teacher may prefer to field questions on the science in the book. (If this is the case, you may want to have your students think about and prepare questions ahead of time.) In teaching

The Andromeda Strain in this fashion, most of the responsibility rests with the English teacher, although some collaboration takes place.

Another level of collaboration involves approaching your most amenable science colleague, even one who teaches a different level and different students, and asking if he or she would be willing to incorporate The Andromeda Strain into one or more courses. You would teach from the literary perspective, while the science teacher would teach from the scientific perspective.

Ideally, both of you would have the same teaching schedule and could combine classes for the duration of the unit, team-teaching from your own strengths and then being responsible for assessing and grading only your own students. Combining students of different grade levels should not be a problem; generally, students enjoy being cross-grouped, especially for a brief period of time. You may need to caution against the older students overwhelming the younger ones or, worse, a bright group of freshmen reading rings around a struggling group of juniors, but the beauty of using the science classes in your groupings is that the sciences taken in different years are almost always substantially different. Thus, combining freshmen with juniors will produce, for example, an earth-science perspective combined with a chemistry perspective. Work on affirming the students' strengths and differences, not their weaknesses.

Unfortunately, schools are not the ideal world; most of the time, even if we are amenable to the idea of team teaching, our schedule is different from our chosen colleague's or other problems interfere. If that's the case, then each teacher can teach The Andromeda Strain in his or her own classes, touching base with the other regularly or as questions come up, and combining students either periodically or only for a final discussion. Combining classes at least once is recommended, since science teachers are sometimes intimidated by the idea of leading a discussion and feel more comfortable having the English teacher leading it, jumping in when there's a point to be made.

The level of closest collaboration involves working with whoever teaches science to your students. In this case, you and the science teacher work together before teaching to plan the unit, agree on reading assignments, and decide on and divide up other assignments. Each of you would teach The Andromeda Strain in your own classes, from your own perspective, teaching to your strength. Working like this would probably enable you to complete the unit in half the time it would take you to do it working alone, since students, having the homework time for two different subjects available for reading The Andromeda Strain, would be able to read much more every night and learn much more every day. Or, you could allay your science colleague's qualms about taking so much class time to teach something that's not in

the syllabus by doing The Andromeda Strain periodically--every Friday, for instance--and taking as much as a semester. This may also spark students' attention to other aspects of the courses and increase integration with Andromeda Strain topics.

The question in most minds right now is probably, "This all sounds great, but how do I get a science teacher to work with me?" There are several possibilities. The first is also the most obvious: ask. You can generally spot someone who would be amenable to co-teaching in one of the ways described above or who might have other suggestions. You might even consider proposing that the two of you apply for a minigrant to develop a collaborative unit.

A more subtle way of drawing your colleague into collaboration is by asking science questions generated by the text--for example, how do satellites stay in orbit? what are the criteria for life? how do scientists analyze an unknown substance? where can I find supporting information for my teaching, like visuals of how heat sensors work, or pictures of bacteria that I can project or display? Shape your questions to the interests and expertise of your colleague, and, if the reception is cordial, invite him or her to talk with one or more of your classes on the topics.

You can also take advantage of science teachers' complaints--students' lack of interest, their perception of science as an answer or a product no matter how hard the

teachers try to ingrain science as a process, their view of scientists as dispassionate people applying a treatment to a substance rather than thinking and connecting and creating in order to advance science. The Andromeda Strain counters all this. It puts science into a real-life context of people with quirks and agendas who still work as a team toward a common goal, and thus offers a different perspective on science as a career from that which is in many kids' minds. It integrates biology, chemistry, physics, and earth science with one another and with current events, and might help students to further their own subject-matter integration, to the delight of their science teachers. It increases student understanding of the roles of imagination and common sense in science. And, as a bonus, it gives a science teacher a different perspective on his or her students, showing their insights into controversial issues, their facility in reading and dealing with literature, their ability to integrate what they read with what they know. For most teachers, in any subject area, this is a real boost when students and teacher are tired of one another and of the subject matter. In fact, reading The Andromeda Strain together might almost conserve rather than consume time, since new insights and fresh perspectives and energy can be brought to subsequent work.

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